Notebook, N-09-04-20.2

This notebook covers the period April 1909-August 1910. All entries are by Edison. The book is the second of two books that contain notes regarding attempts to find a hard, non-celluloid material for use in phonograph cylinders. Included are entries pertaining to the use of shellac and various other compounds to produce a substance that could be molded but would also be durable enough to sustain more threads per inch on the cylinder. There are several notes indicating Edison's application of the experimental results to disc records. Some of the entries in this book were transcribed from N-09-04-20.1. The pages are unnumbered. Approximately 80 pages have been used.

Experiments to obtain a satisfactory material for moulding phono records by pouring into the mould from a liquid state of such a hardness and toughness that it approaches Celluloid - whereby from 400 to 600 threads can be used per inch of length and which shall be cheap, not wear or wear the saphire reproducer, that shall have sufficient shrinkage to permit of Extraction from the mould, that will not be Tackable or effected by the weather, H_2S CO_2 or water,

Book started April 20 1909 entered from daily work book -

Naphtalene, moth balls. - Dissolves shellac good, proportions which permit Nap to crystalize out seperately from the lac is best, its hard + tough on fine cut, cuts like wood, if proportions of lac increased Nap does not Crystal out and it remains soft.
Only method of experimenting is to have in a small dish approximately a definite amount of the melted solvent + To this add succesive increments of the material to be dissolved such as Shellac Rosin Manila Copal etc and pouring

out a small amount into a better dish after each increment has been added. Thus one can see if the 2 seperate out on cooling & produce a material of the desired character or if the maximum solution gives another desired material — I call the end where the solvent crystalizes the "low end" & the maximum solubility of the added material the "high end". the new material must not stick to mould —

The trouble with Naphtalene is that the low end is not quite tough enough & the smell is objectionable as it sublimes at even ordinary temperatures

Shellac

Mononitronaphtalene when pure as nitrated in glacial acetic + crystd from Alcohol. gives a good button at low end.

Monobromo camphor gives a low end button that is hard but proportions must be too accurately made to be practical + the surface after cutting gets an efflorescence — The high end when maximum practicable point is reach gives a button too easily affected by temperature —

Shellac

Resorcin is a fine solvent for shellac.
It gives at the high end a material which does not differ from shellac except it is a shade tougher = In the dish the liquid at high end is rather thick, there are some bubbles of gas comes, it must be stirred well very little smoke, a fine shaving is flexible, it chips on heavy cuts. Sticks to dish, on prying edge of 1½ inch button with knife it came off there may be trouble in sticking to mould. It scarcely softens any by heat of hand

Shellac

Anthraquinone

Very high MP sublimes terrible, even in the dish – can't do anything with it – might answer to mix

Hydronaphtol, This is made by Seabury and Johnson and is a trade name think its Beta-Naphtol, will see

Good solvent for high end – very little smoke melts fairly easy – viscous, must be well stirred – after one hour very hard – next to highest button, very tough and hard, highest is hard + fine, cut heady – scarcely any softening by heat of hand

Sticks to dish only 1/4 came off on prying

Shellac

Sulphocarbanilide made by L OH from action CS_2 on Aniline –
Works on high end only – very hard & probably brittle, Cant get off dish –

J W Aylsworth Red transparent fusible Condensation product of Phenol and Formaldehyde dissolved in unlimited amount in Melted Resorcin its limpid when 85% is the product + 15% Resorcin

Shellac

Hexachlorobenzol
MP so high cant do anything with it
it might answer to mix with other solvents
to raise MP or to change hardness—

Benzidine = no low end - high end brittle
dont come off plate. NG

Carbazol MP too high - sublimes so bad that
its impractical

Hydrochinon - MP rather high - sublimes
dissolves shellac ok low end no good.
high end button sticks to plate, softens by
heat of hand.

Nitroso-beta-Naphtol - NG decomposes

Shellac

Dimethylamidoazobenzine (Butter yellow) dissolves shellac fair - viscous - no low end dont smoke

Quinine Dissolves shellac perfect unlimited amount - th very thick at all stages - low temperature, comes off plate good. Button fraible brittle, but hard.

Bromalin NG - Dont melt - decomposes

Methylacetanilide "Exalgin" good solvent, dont get viscous or thick except at high end but not too viscous to work poor at low end no margin some smoke at high end might say considerable smoke high end flexible after 2 hours, possibly wants more shellac Comes off plate O.K.

Shellac

Benzonaphtol 75c lb Dethaen —

This is a peach solvent for shellac, small margin at crystal or low end, its tough not very hard, you can then proceed adding shellac until its nearly all shellac + is limpid enough to work practically. No smoke — low temperature —
Very tough + hard on high end, — be ok for petits pressed records. Only slightly softens by heat of hand
1/3 comes off dish by prying edge of button by knife. This may kill it in practice — DeHain price 75c lb it would be cheap enough as little is required

Shellac

Dinitrotoluol Para-

Not good solvent - only mixes - dont think it will answer - should try the Meta -

Bottle marked Nitrotoluol Bad solvent
Neg - probably Para -

Quinidine - Actual solvent - no low end - cools instantly hard and brittle
Comes off dish of itself, its too brittle, & if more lac is used its too thick to work It might be used with other things to help dissolve

Shellac

Metadinitrobenzol

This is a fine solvent for low end, plenty Margin, cools quick, melts and works at low temperature, Cheap - no smoke, that amounts to anything — vapor I think may affect one like Mononitrobenzine, Yellow low end button hard-woody cut JWC made some records they are fine he wants a little more toughness leaves dish perfect.

Shellac

Pyrocatechin No low end - its a solvent
but it gets thick very soon as you add lac
only goes when too hot, gets down
clear when dish removed - high end
very tough + hard, lead like cut.
Can't get it free from dish
Softens considerably by heat of hand

Methacetin Not a good solvent
No low end. high end n.g.

Shellac

Triacetyl-hydroquinone - Lac dissolves very
Easy - works fairly well, afraid acetic acid
comes off and would hurt mould -
Low end Great crystalizing power - its not
very cheap - dont condense Lac

Phenylacetamide NG no cryst sublimes
bad too brittle high end.

Carbon trichloride - too sublimeable NG

Shellac

Benzophenone - good solvent - dont smoke much, low end hard but brittle high end good tough small out flexible, its not hard enough but may want more shellac softens by heat of hand.

Benzamide Solvent power only fair - not good on low end goes + swells when moderately heated up, its very brittle on high end just like Cotton Pac

New

High End Comes from ~~of~~

dash

Shellac

Phenanthrene - Good solvent - good low end crystalizes about like Naphthalene: no smell hard end hard but somewhat brittle, may be OK —

Bichloronaphtalene - no low end high end too brittle NG.

Fluorene - Only good at Crystlzn End hard dense

further Experiments show it would work at Crystl End but not very tough but not high end tough Ductile and like it comes from dash

By mistake I entered it here

Shellac

Trichlorophenol - Good solvent dont cryst out on low end It is fine for high end in fact splendid cut flexible hard as button lac Handly softens any by heat of hand This seems unobjectionable for high end as its safe to work & can be obtained cheap at Niagara

Tetrachloronaphtalene

I mixed a little trichlorophenol with it say 1/3 or 1/4 and it at once became a good solvent yet I went way up before cryst end was reached then the button was dark hard but chipped This shows that many other good solvents probably can be used to give required solvent power - yet get a low end material about 1/3 at best point comes off dish by prying edge of button, scarcely any softening by heat hand -
At one of the low stages the material looks and acts like gutta Percha

NEW

Shellac

Tetrachloronaphthalene and Trichlornap mixed made by Dr. This is a terrible crystalizer almost impossible to make a high end it gets so thick - gases but little + this is probably due to impurity it quiets down quickly + free of gas. low end smooth but very hard + brittle chips out on heavy cut button 1/8 comes off by prying edge on high - ~~to~~ Cryst end Comes off Ok Yellow dense very hard chips out on cutting tts so hard, dont cut like lead.

Para - mononitrochloro benzol - or chlornitrobenzol
good solvent not good on low end cryst out but too crystalline, Smokes considerable too much for practice. Cryst end dont come off dish - high end soft & tough - softens by heat of hand.
Only made fine white brittle hard cryst
High end when cool tough as Celluloid + much harder. Stix dish
Quick; 24 hours high end leaves dish
Easy - probably not cost when I find it

Shellac -

Tetrachloronaphthalene, impure is a wonderful crystalizer, Dr G is making some pure.
Today Dr G made some purer and it works ok
The crystalizing power is enormous,
I keep putting in shellac until it got too thick to work & yet the button is on the lower or crystly end. It dont appear to be a solvent first lot of shellac put in globuled and I had to put in the 2nd lot & dir to get an even solution
Cant say how much shellac can get in by carefully requulating temp
scarcely any smoke, guess on little as more shellac put in. Mt fairly low but to get shellac in temp has to be raised considerably -
This material would be fine to mix with a solvent for high end that give toughness and yet by the powerful crystly properties give a low end material -

As high as it went - yellow very hard, small showing tough - dense - ok comes off ½ by prying - with a mix of this & other solvents should be able to get anything desired Continued

Kauri

Benznaphtol NG
Quinine NG
Phenanthrene NG
Methacetin NG
Benzanilide NG
Fluorene NG
Benzidine NG
Dimethylamidoazobenzine N.G.
Binitrotoluol fair low end, more brittle than others
Acetanilide NG
Pyrocatechin NG
Benzophenone very sticky all the way up except at extreme end, here Tough but too soft
Bichloronaphtalene Dry. acts funny — oxyd nearly all the way up but not hard somewhat trouble cut. might experiment more on this —
Resorcin — extremely hard at very low end
Epalgin NG —
Binitrotoluol — low end not hard —
Hydrochinone — part way up it is just as hard as like Kauri itself — it helps getting it into a liquid — wonderful amount for a quick Varnish —

Kauri

Trichlorobenzol n.g.
Mononitronaphtalene alpha NG

Shellac

Tetrachloronaphtalene Continued
See page where Trichlorophenol is
entered — by a mistake I recorded an
Input of Tetrachlnap + Trichlophenol —
See it for results —

Chloral hydrate NG

Pinakon, too thick, bubbly no cryst end
high end extraordinarily flexible bulbs
even at freezing temperature

Naphthalene Chloride Dont melt

Shellac

Hexachlorobenzol. high mp. dis shellac by stirring – short low end very hard, from yellow the next increment is non crystalline but what is remarkable the hard the next increment is as hard as long, high ends stick to dish, low end comes off auto only 2 low end buttons,

Piperin – good solvent, flexible by heat of hand, brittle cold, Chrisbo quick when at high end very little acetanilide clears solution of bubbles, and makes it limpid, stick to dish – no low end

Shellac

Cyanamylic acid good solvent - poor on Crystal end, too flexible at high end

Cressotinic Acid - Curious - very sticky and viscous, ropy even with lots of shellac bubbles bad - Should make a flexible varnish, its Phenomonal -

Copaiic Acid Very brittle NG

Benzoate Manganese - NG

Rosolic Acid MP high - it goes to liquid, if melted solvent is found it might beat shellac for hardness + polish -

Rosolic Acid – powdered

Resorcin – not good solvent, gases high end – apparently no low end

Dinitrotoluol. fair solvent, one on Crystal end – ng – too brittle, high end porous from gas, brittle –

Mononitronaphthalene Alpha crude – NG

Hydrochinon + Rosolic low down there is a proportion that is extremely hard – not tough

Resorcin, there is a point about the middle where very hard – not tough –

Rosolic acid

Quinine NG
Amido azobenzol NG
Benzidine 1st button very stiff tough pitch
others brittle, bubbly.

Hydroquinone Bi acetyl –

Hard but poor at low end, then sticky
then very hard + powdery cut, then
at highest end brittle powdery.

Phenylacetamide – Good Solvent
tough stiff Pitch at low end

Bichloronaphthalene NG

Pyrocatechin NG
Acetanilide NG
Para toluidin NG
Dinitrobenzol NG
Resorcin NG
Benzidine – Base NG
Paraphenylenediamine very hard
high end, brittle –

Rosolic acid

Metatoluendiamine – Extra length pitch
lead cut on very low end.

Toluidin Base	NG
Amidophenol, para	1st button low end very hard
Amidoazobenzene	NG
Toluylendiamine	NG
Metaphenylen	NG
Amidophenol, ortho	1st 3 buttons hard –
drugy + chug cut	
Acetoludin Crude	NG

Evidently Rosolic acid
is not good for phono work

Phenomenon –

Shellac treated with ammonia until gets very dark then poured off – then water added which dissolves some of the shellac. If this is precipitated by HCl + washed free of acid + dried 2 or 3 days, then the low and in Di Nitro benzol is almost only 2 buttons but high and DONT stick to dish = it is not hard enough but just as tough as celluloid softens only little by heat of hand. could probably carry it higher although it was rather thick possibly some of the other solvents might be better. Evidently the first amount removed took some very sticky stuff out & have some of it and after HCl it melts in water + is sticky, but brittle cold. The large bulk not dissolved by ammonia say 90 to 95%. I will try + perhaps can get a high and that will leave dish alone – = just tried some with Di Nitrobenz coagulates apparently 2nd button – 1st but crypt. hard – no better than reg lac + not lumpy

Shellac

think some of the other solvents will work —

Next morning highest + big button, 1/2 stuck to dish. But its just as tough if not tougher than celluloid which I compare with. A chip 1/8 long bends like celluloid = in fact I see no difference except the lac is harder and tougher — very little softening by heat of hand. The only dif is that sheets or rods would break in bending much.

New

Acetyl Cellulose

Phenylacetamide

This shows solvent powers only got 3 buttons 1st pulverent 2nd little harder semi trans 3rd hard stop got too thick its very much harder fine showing little flex its about as hard as Carnauba, but tougher = May be something in it by regulating the heat giving time = Its new anyhow Should expmt further.

Benzothexachloride

Brittle + powdery all way up 5 buttons last button very hard brittle, crystalline cuts to powder — hard to dissolve.

Monobromocamphor.

2 + 3rd button hard - 3rd button Extremely hard not tough dense, dirty white color, Can hardly break it 4th or last button break - deadump - soft tough - 2 + 3 buttons come off plate cuts,

Condensation product of Naphthalene + formaldehyde is like white shellac but with Cryst melted solvents dont work good softens very boldly by heat of hand - only tried Dinitrobenzol

NEW

Condensation product with H_2SO_4 + formaldehyde cooked until tough - dont dissolve in Dinitrobenzol haven't tried other solvents,

Acetylcellulose.

Dinitrotoluol dissolves slow - 4 buttons Cryst - hard - not so good as reg shellac - last 3 non cryst soft tough

Pyrocatechin NG
Resorcin NG

Acetanilide made only 3 buttons dont decompose, hard as glass so hard cant cut only scrape, and inch button 1/8 thick cant break it by hand - all this may be due to the Cellulose but possibly its acetanilide itself the Cellulose causing it to Cryst Exceedingly fine grain - comes off dull cuts + has a good surface Experiments should be made with acetanilide with other things to cause fine crystals this would lead to a low MP glassy hard material which could be made useful on account of coating + its great strength — It can be pressed hot into any shape — acetanilide costs 23 cents

NEW

Acetylcellulose

Alpha — mono nitronaphthalene Crude NG
Trichlorophenol — good solvent 3 Gallons
Crystal + ng — last button looks and acts
like Tough Shellac — Trichlophenol
seems to be a good general solvent
for organic amorph compounds

Amidophenol Para	NG	
Resorcin	NG	dissolves good
Amidoazobenzol	NG	" fair
Tolidin base	NG	" "

Acetoluidin Crude dis fair — very hard
Cant break powdery out, leaves dish
surface only fair — Sample saved

Benzidin base Dissolves good — high end
tougher and harder than Celluloid large
cut chips — dont leave dish — sample saved
fine surface on part broken of by prying

Acetamilide dont dissolve Aluminum Palmitate
Hard residue from BD dis in acetamide
hardens it strengthens it 2nd button
3rd button stiff pitch, flexible, pitting in shelf life
on 6th button Coagulates —

Acetylcellulose

Paraphenylen-diamine – hard – bad surface –
leaves dish pitty ng sample saved 3 buttons

Toluendiamin dissolves fair – Tougher +
harder than celluloid – dont leave dish
sample saved —

Dinitrobenzine, NG
Para Toluidin NG

Toluidine base, dissolves fair
tough as Celluloid high eld – dont
leave plate. saved sample.
brittle on heavy cut

Metatolunendiamin – Very hard to cut
saved sample –

Manilla Copal

Quinidine	NG
Quinine	"
Diphenylamine	"
Phenanthrene	"
Monobromocamphor	"
Tetrachloronaphthalin	"
Amidogobenzol	"
Phenylacetamide	"
Fluorene	"
Dibromonaphthalene	"
Methacetin	"

Quit on Manilla as it seems to be NG

Stearate of Alumina
Sol in hot Pet Benzine - Anhydrous -

Exalgin - mixes high heat, has lower
high end - too brittle, its like wax.
(ie cuts like stearic on high end -

Tetrachlornaphthalene - dis good
too soft - ng = Dr. I. has tri in it NG

Quinidine NG
Quinine NG
Phenanthrene NG

All too soft stopped on this -

New

By acting on Naphthalene dissolved in Chloride Sulphur hot, hots gas + then there is a condensation product like shellac looks like it pulls like it, resin. By boiling with alcohol something comes out + it gets stiffer when no more comes out. Boiling Benzol extracts a lacquer — the residue is tough + very sensitive to heat of hands — probably can vary depth hots resinous

New

Think this could be made to work OK —

Think the name is wrong

get Original Bottle

Toughness

Good A.1.

Shellac Continued

Bengal Chloride —

Has 3 bottles Crystalizes — 3rd bottle yellow very tough, flexible yet hard get more as they heat hand — Lead like flexibility — Chip curls bend not Extra hard

High end good tough — but dont behave dark — if heat goes too high Condenses Shellac —

Low melting point — dissolves good — with slight sublimation when get too hot — scarcely any smoke Limpid —

If this is Cheap & Easy made its OK = as its Toughness is great —

Recently made some can only get 2 bottles very tough but not hard — But with purified Tetrachlor about 4 or 5 bottles up where found a bottle or little Dichloroethylene stirred — gives all the toughness desired as its OK for toughness

New

Shellac

Hydroquinone Biacetyl —
Very fine solvent of shellac even
with lots of Shellac It
limpid as water — poor dark
2 Button Crystal End — no stix
dark — high end soft flexible
like lead — might do for varnish
put on hot —

Bibromonaphthalene — Not good
shellac floats — when more put in
OK — but poor Crystal End
High End must wait till long

New

Shellac

Benzophenone

Good solvent — No crystal and Ethanol

Soft ~~[illegible]~~ ~~[illegible]~~ high emp — will see if

get a film in morning — found 2 bottles had

gone yellow, hard & brittle, in morning — but not hard

enough to cute powders yet. a phenylpyrrolidone, great change

Sulphophenyl Dodecanol

Anthracene Bibromide ~~[illegible]~~

Melts too high —

New —

Toughness for Shellac

Shellac

Alpha Naphtol Shellac unlimited
Soft thick at all times no Crystal and
1st to 3rd Bullen sticky soft —
then gets Celluloid like
This would probably be good
to toughen the Crystal gen when
they prove brittle
Very small quantity would do
Don't Carbonize shellac up to
limit —
at a certain point up to tough & a
little soft Next Bullen hard —
tougher than celluloid chip bends
several times before breaking
Next Bullen harder & brittle but
small chip very tough — last
Bullen Very hard brittle like Bullen
but small chip tougher than Bullen

Tried this to toughen the Gritte Allore Nap
stuff but it dont do it interferes
Crystal yellow get to pliable —
what is small — that about make
shellac so pliable —

Shellac

Nitroaniline – not good solvent
no Cryst – 1st Soft 2nd hard brittle
NG

Iso-butyl phenol no cryst – ng

Chinolin Salicylic no cryst and NG

Turpentine Hydrochlorate
Condensed Shellac right off NG

Shellac — XN

Greenly took Nitro Nap Alcohol of
Chlorinated it without Cottrizer
until solid on cooling — pressed out in
cloth till Canary yellow —
Then put some in 2½% KOH,
Boiled it till nearly whole dissolved
was out, still some particles that
had settled thus — washed free
KOH dried not perfectly free water
& tried with shellac — Work
up to the limit of viscosity &
Cast out Not very thin liquid
Addit Cardamo Che shellac
bullons stuck to dish in Cooler
possibly 62 OR, in moved —
It fairly tough on fine cut
when high up — It would be better
to be a little tougher.
This could be a big saving in cost
getting rid of Crystalizing & other
Manipulations — It can probably
be improved by getting some lower
N.P Chlorination

High point or end Comes off
plate into —
Something in the
Crude Anthracene that
is going to cook

Shellac

Treated Crude Anthracene
alcohol — not pure but point
not of alcohol, = very limpid
at high point but the Comes off
plate Anthracene

There was considerable Inflammy
had use dat, shellac

Run it down

Shellac

Good —

Chlorinated Silvant
Naptha, abt ½ chlid. Dry
took out & dissolved some
the white — dissolved — Half
alcohol — Not very sol —
The stuff that dissolved dis
(but pbly wd if more alc) filtered +
pressed by hand — dried —
Very lumpy — 5 Gallons
OK — good — not so tough enough —
but needs its nice to work —
Very lumpy up to almost burst
It flows from dissolving when
but little lace in but not
bad when considerable in
Bottom are redish not yellow —

0-054

Dr G. distilled it, this is 1st lot
~~[illegible]~~
which dissolved in alcohol —
Dont seem smoke so much
but at higher temp ~~[illegible]~~ or smoke
concentrates —

This is BETTER — MORE TOUGH
& Tough Enough Liquor
Sometimes Comes off smarts
Eyes —
~~[illegible]~~

2nd lot, Dr G which on distilling
had higher BP — not so alcohol
but wonder why if had more al —
in little drink has higher BP not
very much smoke about some or
less — smarts eyes when dropping
on paper = It dont take so
much lac before getting Smoke
than 1st lot, but its OK
Chills VERY quick = more Gritty than
the 1st = Dont come off drops so well on low end But
Comes off on HIGH END ? —

OVR

So far no better than Napa Telya CP.
but not quite as brittle, not so hard —
More Lubricant —
Apparently in 1st Lot there is a
long BP chlor stuff which
lengthens the fiber which is
absent in this higher BP —

The cellulose of the Solid Chlorid Napthin
made by Dr Q + not distilled & run
dissolving in Acetone —

That not sol in acetone very valuable
(B) Acetone's - MP a little high. fiber soon
A gets thick buttons good Crypt inert
does thick to work when it Condenses
A is longer cut than B —
Dent Soluble in acetone lumps
at right mix of solution crypt ace way
B up till gets too thick than fiber
Condenses — not so much smoke
probably some of A is in it
It cuts tough on small Cut
B dent come off about 18th Cutter up + comes off
Every factory sell in cotton flying
Evidently some part of Solvent.

Hardest + toughest yet

Naptha has a good material to Chlorinate — If CO_2 are fractionating it to separate the right body — then Chlorinate —

Highest of B next to bottom which condensed + which I stripped from dish when other flowed is the hardest + toughest yet

C = is the mother liquor of acetone from which B crystal out when cold. — This after cold was evap down and allowed to totally Evaporate leaving about as much residue of Crystal as B — Then dried — It's pumpid + very little distillable or smoke compared to A + less than B — MP lower — Lac dont involve my I expect when quite hot + considerable eliminating its OK when considerable Lac in It's too much affected by heat of hand low + high — think coming from something in acetone makes it so not desirable —

Good for tough
H Coneoff
dish

Shellac

CP Dichloroethylene. Crystal macaroni
MP 53 melts 60 greasy - too low
MP, fine solvent for shellac -
only 1 good button that took all
night Crystal - not hard, but tough
flex like Cellulose acetate by
hand - Dichloro might do
to mix to bring down high MP.

Trichlorotoluene, long thick
Crystal tough - Resembles
Tetra Nap in every
ways. MP OK lower
than Tetra Nap. Lumpiness
not very good crystal on
high End. Longest cut yet
nearly as flexy as Cellulose
scarcely yellow only by hand
COMES off dish OK

New

By this Tetra Nap made by Grossly from Nitro Nap a pound 3 times in gasoline then washing with 2% a little alcohol the sediment goes out on agitation & gasoline poured off it Crystalizes dead white

It works fine with Lac gives white bullion but entirely too brittle more so than yellow left in. I think 5 or 10% of Tetra Chlorotoluene would lengthen it out.

Neo

For Toughening

Tetra Nap

OEW

Only big lot yellow Tetra Nap Crypt
from Naphtha Nap & big fm C_6C_6 —
which gives all bitten white
Crypt. but chip out when cut
with knife + bitty, + also which
Condenses when too much
shellac or heat is made
Tough + big chip like Celluloid
by using Benzonaphtol
or Alpha Naphtol

Can get quite a hot in without
destroying Crypt's power
goes to 90 ?

Two should make any of
the Tetranaps work OK

A. Naphtol is 15c lb —

Benzonaphtol 60c lb —

too much A Nap it soften by heat hand too
much — Benzong is not so sensitive —
proper proportion it OK —
Note Bottom stick to dish Throughout also
so also

None or last of this page comes off dish

Acclaimed. Dont disturb
Crypt of Tetra Nap. its white
Safe Gittem up — it acts
like A. Naphtol & Benzyl and
+ is good if right proportion
+ is tough + also likely sensitive
to heat of hand if too much
Its light yellow Crypt + not very
sensitive to heat hand —

Tetra Toluene is just as tough
if not tougher + harder + just
sensitive to heat hand.

Finished that next morning Acclaimed
buttons which were sensitive to
heat hand were no longer
so, evidently Acclaimed slowly
crypt out as well —
Think this Combn is ok
but not so good as plain
Tetra Toluene which is
the standard of
perfection

Have just finished 5 trials of buttons
with Dirty yellow crystal Tetra Nap
which gives brittle buttons
Tried
Trichloroethanol 1 pounds
4 buttons threw no more shellac
& pound trialls for 2 inch of 3
more buttons —
4th button slightly brittle
5 " with extra punch ok very pliable
Cut a tough as hard as celluloid
scarcely bend after being in mouth
6th button with another punch Tinder
bends too easy
Tried to dissolve to heat + Condensed
Stix dish all way up
Quinine — brittle all way up
Stix dish — not Condensed
Makes nice lumps —
Hydroquinone brittle all way up
stick dish, Condensed Hard button
Epalgin (Methylacetanilide)
Makes very lumps, Tough on 2 pounds
begins gets loosened by head Stix dish
Fluorene, Tough on 4th button brittle
~~2nd~~ 2nd pound 5th button tough OK
~~bends~~ bends somewhat in mouth not as
good as Trichloroethanol

With large quantity Excalgin
Tetra Nap makes Celluloid
Leather — just as flexible
& tough — fine for wear
proof cloth
~~Tetra~~ Trichloroethanol long —
same thing
Even better tougher

Expts Angle 1910

Condensed Resin formaldehyde ~~phenol~~ mixed with flowed asbestos powder. The resin made more ~~crumbly~~ clear by adding Hexamethylene –

15 Resin
2 asbestos –
Little, thick some bubbles
Cold - Brittle hard

15 Resin
4 asbestos.
Thin, seems any bubbles
Thin as Table syrup probably
thinner & worse to work & thick
to put fibres in. Thin is I think ok
Cold brittle but stiff
(rough on edge & weight after by heat mass)

15 Resin
6 asbestos, thin like water & clear
Unnecessarily thin
Cold, very tough but, brittle somewhat too sensitive to heat of hand. ~~other~~ thing be ok with less asbestos

15. Resin
8 acetamide – too soft –
added some asbestos, but only little
& it was very thin, could use
dipping process with it,
abt as thick as table syrup
with asbestos in –
Can dent the glass when cold
with nail
The asbestos is not enough, but the
Edinorendmly tough, bends easily
with heat of hand. It probably
would be ok with more asbestos
on a paper or other backing
it certainly would not crack
from Expansion & Contraction
Inclined to think from 2 gms
acetamide to 15 Resin up
to 8 gms would work
depending on the amount
of asbestos. am not
drying some of the flooded

4 gm by least hand com.
draw it out long
ways

Has more reflex
powers than acetanilid
probably shade thinner
for some ailment

asbestos cut to well
not be ready before
Mng - sarabhai say (re) the
one with small quantity
asbestos -

15 Resin
2 Beta Naphtol

Some bubbles - little thicker than
Cable syrup - Cold bottle above
boiling for longer also, sent again by hand

15 Resin
4 Beta Nap
Then as table syrup
few bubbles
Cold tough cut bottle
Reflux Easy by hand, will be OK
with asbestos
Possibly too soft. 3 gm be safe

14 Rem
6 Bela Nap
Thm as Tablet
Syrup Thm & gum
about like water

15 Rem
8 Bela Nap
Thm as water

---

15 Rem -
Several doses of Salicylic
acid - not good as
Bela Nap or Acetanil

15 Rem + Phenacetin
Not good -

Expts to see how much floated asbestos powder 15 Resin 4 Acclaimed will take so it can be worked.

---

15 Resin –
4 acclaimed –
8 asbestos –

Very thin fluid dip –
about like thick table syrup –

17 Resin
4 acclaimed
8 asbestos
of about like CO glycerine.
Hard, curl chip. not tough but
clear & no bubbles Pots like this

15 Resin
4 accelerator
10 asbestos –
Like thick molasses
it pours OK but doesn't
quite run flat in the
dish – Cured cover
seems OK –

Scarcely at all sensitive to
heat of lamp

Not tough cut but curls
This is due to less accelerator
for tough cuts want 6 accelerator
etc. hard

15 Resin-
6 Acelamulcl
18 Asbestos,

Thick mcolasses, dont flatten
in dish, journal — it runs out of
hot dish OK Cold Tough
Cut very hard

15 Resin
6 Acelamulcl
15 Asbestos

Thicker than Thick Mcolasses
must run slowly out hot
dish - journal flat -
Think this may be too
thick to work conveniently
but can be worked
ok if have to —
Cold Tough Cut - very hard

Make for Patt

15 Resin
4 Acdanlid
8 Asbestos,

Monochloronaphthalene Liquid

dont dissolve Lac but swell.
like Tetra Nap - but almost
any granular Lac goes in -
bubbles considerably but
when poured in dull these
disappear probably vapor
of Monochloronap condenses
Lac runs together. The button
is ok cut. Like Celluloid is
fairly flex by heat hard +
to hand, not scratched by nail
wants great deal skinning
much shrinkage will do for
big ok —

Iso. Emulsal agents and
tamp — thin shortly the
15 hae 5 Telra Compound

5 hae
1. 700 Telramp + 16 drops Iso Emulsal
very thin so it takes lots
Chalk can add 60 drops
or 2 cc + add enough
amt Chalk + on cooling
~~Tel~~ hard but flexible
+ pliable, flex below
2 wrap not crack on
paper blanks —
Without Chalk soft
as Leather —
~~The~~ Try def liquids
to do same thing

List of chemicals which have been tried with Thelle
Up to May 15 1909

Naphthalene
Mononitronaphthalene
Monobromo camphor
Resorcin
Anthraquinone
Hydronaphtol
Sulphocarbolate
Hexachlorobenzene
Benzidine
Carbazol
Hydrochinon
Nitroso-b Naphtol
Dimethylamidoazobenzene
Quinine
Bromalin
Methylacetanilide Eserin
Benzonaphtol
Dinitrotoluol para
Quinidine
Dinitrobenzene Meta
Pyrocatechin
Methacetin
Triacetyl-hydroquinone
Phenylacetamide
Carbon tetrachloride

Phenacetin
Phenanthrene
Dichloronaphthalene
Fluorene
Trichlorophenol
Tetrachlorohydr. Dry
Mononitrochlorobenzol Para
Chloral Hydrate
Pyrokon
Naphthalene Chloride
Hexachlorobenzene
Piperin
Cyanuric acid
Chaulmo acid
Copaiba "
Benzoate Na
Rosolic acid
May 15 —

To Get Tried
~~Anthraquinone~~
Benzpheron ✓
Paraphenylene diamine
Naphthalene Dibromat ✓
Acetolidin

Chloronitrobenzol
Tolidin
Benzonaphthol
Benzolechloride
Naphthylamine hydrochlorate
Amidoazobenzol
Meta-Toluylenediamine
Orthoamidophenol
Hexachloronaphthol
Dibromoanthracene
Tolidin
Sulphophenol
Benzophenol